

BRENTHIS APHIRAPE (HUEBNER) IN NORTH AMERICA, WITH A NEW RECORD OF THE SPECIES FROM MAINE (LEPIDOPTERA, NYMPHALIDAE).

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On July 7, 1937, a worn specimen of *Brenthis aphirape* was taken by Mr. L. P. Grey on the "tableland" of Mt. Katahdin, Maine. The specimen was acquired by Mr. Cyril dos Passos, who asked my opinion of it. Since one specimen was obviously insufficient for any taxonomic conclusions, we determined to try to get more. It was my opinion that if *aphirape* were really established in the vicinity of Katahdin, it would be found in a high, cold, acid-bog habitat. The topographic map shows the presence of a large bog called the "Klondike" at 2800-2900 ft. elevation just to the northwest of the main mountain mass; and we determined to try here.

On June 28, 1928, Mr. dos Passos, Dr. J. J. Copeland (botanist at the College of the City of New York) and I began attempting to reach the Klondike. There are no trails; and the country is very rough and heavily timbered. Fortunately we hit the best route on the first try. This is to follow a landslide up the west side of Mt. Coe (sp?) from the Sourdnahunk Tote Road. Mt. Coe lies just west of the Klondike, and is not shown on the topographic map for the area (Katahdin quad.); it is the most western of the high points in the ridge that bounds the Klondike on the Northwest, West and South. In this ridge Mt. Coe lies between South Brother (alt. about 3800 ft.) and Barren Mt. (3681 ft.).

After climbing to its summit, we descended the east side of Mt. Coe into the Klondike. By this time the weather was cloudy, so that no butterflies were seen; but a good series of *Crambus labradoriensis* Christoph (*Pyrallididae*) was taken. On the next day (June 29) we returned, making better time over the now-known route, and favored with better weather. In accordance with our hopes we found the *Brenthis* present in considerable numbers, and took a series of 53 specimens in all. The majority of these were somewhat worn.

THE KLONDIKE.

The Klondike occupies a basin approximately $1\frac{1}{2} \times 1$ miles in extent. A number of streams empty into it much of the water from the western part of the Katahdin massif. These converge to form a single stream, of which the outlet from the basin is to the North-

east. The floor of the basin is comparatively flat, so that the flow of this meandering stream is comparatively sluggish.

The vegetation of most of the basin-floor is of typical acid-bog type. Most of the area is covered by a thick growth of *Picea mariana* (black spruce) through which it is often very difficult to force one's way.

Along the stream are a few small areas of sphagnum-heath-meadow, of which the largest that we were able to investigate was no more than 200 yards in diameter. It is in these meadows that the *Brenthis* occur; and it is a reasonable assumption that it is here they are breeding.

The meadows are covered with a very thick growth of *Sphagnum*, in and up through which a considerable variety of acid-tolerant plants is growing. Most noticeable is the fact that the Black Spruce-Larch forest¹ is encroaching upon the meadow areas at a very considerable rate. Everywhere in the meadows one sees what appear to be spruce seedlings a few inches high; but close examination shows these to be the tops of small trees sometimes as much as 3 feet high that are mostly buried in the Sphagnum. The zone around the edges of the meadows shows a thick growth of spruce and larch gradually increasing in height to the forest proper.

The meadows probably originated as beaver ponds. We were unable to verify this through lack of time, although I thought that I could trace the outline of an old beaver dam at the lower end of one meadow. But the beaver have been mostly trapped off, and it is a question whether they will reestablish themselves in the Klondike to any great extent anyway, because of the comparative lack of deciduous-tree food. We saw a couple of beaver cuttings several years old, but no fresh sign.

I have no doubt that unless some such extraneous force intervenes, the Black Spruce will continue encroaching upon the meadow areas and will, in another generation or so, largely obliterate them.

¹ Coniferous forest in general represents the climax; but this should not be applied to Black Spruce forest in particular. This tree apparently cannot stand competition with Red Spruce (*Picea rubra*), White Spruce (*P. glauca*) and Fir (*Abies balsamea*) in normal environments; but, being more acid-tolerant, can exist successfully in pure stands in such bog areas as the Klondike. Black Spruce forest is, therefore, to be regarded as either subclimax or as a penultimate sere of extremely long duration. Erosion, or the accumulation of a thick top layer of non-acid soil, may in time change conditions in the Klondike so that the Black Spruce will be replaced by the true climax coniferous forest.

This will almost certainly result in the extermination of the *Brenthis* in these areas. We do not know what is the food-plant of the *Brenthis* here; it may be Violet, or Willow, or something yet again. We saw neither of these plants in the meadow areas.

A few characteristic plants of the meadow areas are:²

Sphagnum sp.—abundant.

Chamaedaphne calyculata (L.) Moench.—Leatherleaf—abundant.

Ledum groenlandicum Oeder.—Labrador Tea—abundant; flowering.

Vaccinium oxycoccos L.—Small Cranberry—very common.

Kalmia polifolia Wang.—Pale Laurel—common.

Andromeda glaucophylla Link.—Bog Rosemary—very common.

Smilacina trifolia (L.) Desf.—Bog Solomon's Seal—common.

Drosera rotundifolia L. Round-leaved Sundew—rare.

Sarracenia purpurea L. Pitcher Plant—rare.

Carex panicea Linn. Sedge—abundant.

Carex pauciflora Lightf. Sedge—abundant.

Cetraria islandica (Linn.). Ac. Iceland "Moss"—uncommon.

Cladonia rangiferina (Linn.). Web. Reindeer "Moss"—common.

THE RACES OF *B. aphirape* IN NORTH AMERICA

Obviously the point of major taxonomic interest regarding these Katahdin *Brenthis* concerns their relationship to the other *aphirape* populations in North America. However, the situation is complicated by the fact that we really understand very little at present about most of these. Accordingly I here present a short synopsis of the species in North America as a whole, as a base for comparison with the Katahdin material.

Three "races" are recognized at present:

(a) *tricularis* (Huebner)—*type locality* Labrador.

(b) *dawsoni* Barnes & McDunnough—*type locality* Hymers, Ont.

(b-1) ? *nichollae* Barnes & Benjamin—*type locality* "Rocky Mountains" (of Canada?)

(c) *caelestis* (Hemming) (*alticola* Barnes & McDunnough)—*type locality* Hall Valley, Colo.

(a). *Tricularis* represents the truly Arctic population of the species. On the basis of 88 specimens which I have available for critical study (American Museum of Natural History, dos Passos and

² I am indebted to Dr. Copeland for determination of most of the plants.

Klots collections) I would apply this name to the *aphirape* populations of Labrador, Churchill, Manitoba and Alaska; and probably also extreme northern Alberta and British Columbia (Atlin). I do not at present think that the application of any additional race names in the Arctic population is warranted. The Churchill specimens show considerably more similarity to *dawsoni* (see below) than do any of the others; but inasmuch as it is in Central Canada that we would most expect to find a continuous and gradual merging of the northern and southern populations, this does not seem surprising.

Triclaris may be briefly characterized, mainly with respect to *dawsoni*, as follows:

Upperside. The ground-color averages a lighter yellow-brown than in *dawsoni*. The marginal lunules tend to be filled in less with fuscous clouding; the same is true of all the light areas. The dark markings are narrower and more clear-cut.

Fore-wings, underside. The space in cells R_5 and M_1 , between the irregular, dark median line and the row of submarginal spots, tends to be a lighter yellowish than the general ground color *basad* of the dark transverse mark that bisects it, as well as *distad* of this mark.

Hind-wings, underside. The dark basal area and bands are an orange-brown, definitely lighter than the reddish-brown of *dawsoni*. The basal and submedian light spots and the marginal lunules are yellowish, less silvered than in *dawsoni*. The marginal lunules average a trifle larger than in *dawsoni*.

(b). *dawsoni*. In my estimation *dawsoni* represents the south-central Canadian race, not merely the southern one. I have been able to study far too few specimens of it; these are: 1 paratype, Hymers, Ont.; 6 specimens, Sand Ridge, Manitoba; 2 specimens, Riding Mountains, Manitoba. In addition two paratypes are figured in Holland's Butterfly Book; and I have seen a considerable number of specimens in the Canadian National Collection and the U. S. National Museum but have not studied these critically in preparation of this paper.

As so delimited (*i.e.*, from central Manitoba eastward, and not as far north as Churchill, Man., or Labrador) *dawsoni* is a well-marked race. Its chief characteristics have been sufficiently summarized above, by comparison with *triclaris*; however, see below.

(b-1). *nichollae*?. In the northern regions there now remain for consideration the *aphirape* from the Canadian Rocky Mountain regions of southern and central Alberta and British Columbia. Of these I have critically studied 26 specimens. There is a great deal of individual variation among these, but on the whole they appear

to segregate as a group intermediate between *tricularis* and *dawsoni*. They may be characterized as follows:

Upperside. The ground-color is a lighter brown than in *dawsoni*, but is often more "washed-out" and not as bright as in *tricularis*. The dark markings are narrower and more clear-cut than in *dawsoni*. Some specimens show as much fuscous clouding as in *dawsoni*.

Underside. On the fore-wings some specimens strongly resemble *tricularis*, others *dawsoni*. On the hind-wings the dark basal areas and transverse bands are of a dark, rather reddish brown, more like *dawsoni* than *tricularis*; the light basal spots and the submedian row of spots tend to be more silvery than in *tricularis*.

Evidently the specimens represent something of an intermediate condition between *tricularis* and *dawsoni*; but in this they do not agree with the Churchill specimens mentioned above which are also intermediate but differently. Whether or not this Canadian Rocky Mountain form is worthy of recognition as a distinct, named race is a matter of opinion, and probably always will be. At present I prefer to await the study of further material.

It is also a moot question whether or no the name *nichollae* Barnes and Benjamin should properly be applied here. The name was unfortunately based on a small series of specimens from the Oberthür collection bearing no other data than "Rocky Mountains," which is much too vague; and the characteristics cited for it by the authors do not apply well to the general population under discussion.

THE KATAHDIN *aphirape*.

A total of 53 specimens was taken in the Klondike; with the first (1937) specimen taken on the Tableland and two others taken there (30 June, 1938) by Mr. dos Passos and myself there are 56 specimens of the Katahdin *Brenthis* available for study. Unfortunately a considerable percentage of these is somewhat worn and therefore not entirely satisfactory material for critical study. However, the series as a whole may be characterized as follows:

Size.—averages definitely smaller (length of fore-wing about 2 mm. less) than either *tricularis* or *dawsoni*.

Upperside.—The general ground-color above, while dark, does not average as rich an orange-brown as in *dawsoni*. The black markings and fuscous cloudings are heavy, as in *dawsoni*; but a great many of the specimens tend to show irregular enlargements and fusions of these marks, *i.e.*, there is an abnormal percentage of abnormality in this respect.

Underside.—The markings and coloration of the fore-wings resemble those of *dawsoni*.

The silvering of the basal and submedian row of light spots of the hind-wing is pronounced as in *dawsoni*. The dark basal area and transverse bands are reddish-brown as in *dawsoni*. The postmedian yellowish band (just basad of the row of round spots) averages slightly lighter in tone, and is margined basally by a much more definite, narrow, diffuse shade of black scaling than in *dawsoni*. There seems to be a larger percentage of black scales mixed in with those of all other colors, so that the pattern is more diffuse looking, and the general tone dirtier.

On the whole the Katahdin specimens resemble *dawsoni* much more strongly than they do any other *aphirape* races; but *in series* they show definite differences from *dawsoni*, appearing in general smaller, darker, dirtier and somewhat more aberrational. On the basis of the material at present available for study I do not feel justified in applying a name; but I hope to obtain more specimens of the Kathadin *Brenthis* and of *dawsoni*, which may warrant a reconsideration of the situation.

A WORD OF WARNING.

It is probable that other collectors will wish to visit the Klondike and obtain specimens there. I have accordingly given directions for reaching it by the easiest route; although with the admonishment that what with rock slides, blown-down timber and black-flies the trip is a fairly hard and miserable one at best.

May I enter a plea to any such collectors to exercise discretion as to the number of specimens that they collect. The total meadow area available for *aphirape* is very small, and is becoming smaller. We really felt a bit guilty at having taken as many as fifty-three specimens. As far as I know this colony of *aphirape* is the only representation of the species in the eastern United States; and it might well be exterminated by too much selfish collecting. It would be wise, therefore, for collectors to examine all specimens carefully before killing them, and to liberate unharmed all males that are not in really fine and fresh condition. The number of females retained should be kept to a minimum; and if the collector's conscience will stand the strain he should liberate all unworn females so that these may have opportunity to lay their eggs.